

REMARKS

Claims 1 and 3-21 are pending herein. Claims 11-13 and 15-17 are currently withdrawn. By this Amendment, claim 3 is amended to correct the dependency of the claim, claim 6 is amended to more particularly recite the subject matter of the claim, claim 14 is amended to correct a phrasing issue noted by Examiner Maples during the December 31, 2008 interview, and claims 19-21 are added. No new matter is added by this Amendment, new claims 19-21 being supported in the original specification at, for example, paragraph [0041].

Applicants appreciate the courtesies shown to Applicants' representative by Examiner Maples in the December 31, 2008 interview. Applicants separate record of the substance of the interview is incorporated into the following remarks.

In view of the foregoing amendments and the following remarks, reconsideration of the application is requested.

I. Rejection Under 35 U.S.C. §103(a)

Claims 1-6, 14 and 18 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over JP 2002-29701 (JP 701) in view of DE 10115220 (DE 220), U.S. Patent Application Publication No. 2002/0090329 (Ternan) and U.S. Patent Application Publication No. 2004/0013917 (Ukai). This rejection is respectfully traversed.

Present claim 1 is directed to a fuel cell system including a fuel cell and a hydrogen gas supply portion to supply the fuel cell with hydrogen gas. The hydrogen gas supply portion includes an odorant treatment portion to treat an odorant in a mixed gas containing hydrogen gas and the odorant in order to obtain the hydrogen gas to supply to the fuel cell. The odorant treatment portion includes a carrier that carries a porous adsorbent for adsorbing the odorant containing the mixed gas and a catalyst for promoting decomposition of the

odorant adsorbed by the porous adsorbent. Present claim 14 is directed to a hydrogen gas supply unit containing an odorant treatment portion as discussed above.

JP 701 describes a hydrogen supply device and fuel cell device that includes a hydrogen leak detection means. The hydrogen to be supplied contains a prescribed quantity of a sulfur compound as an odorant that may be detected if a leak occurs. The hydrogen containing the sulfur odorant is desulfurized in a deodorization part 28 before being supplied to the fuel cell. See the Abstract. As described in paragraph [0032] of JP 701, the deodorization section is described to include zinc oxide in order to desulfurize the hydrogen gas. The zinc oxide is described to react with the sulfur odorant. See paragraph [0033]. As admitted in the Office Action, JP 701 does not describe the deodorization part 28 to include a carrier that carries both a porous adsorbent for adsorbing the odorant and the catalyst for promoting decomposition of the odorant. The Office Action cites to DE 220, Ternan and Ukai as allegedly suggesting these components for use in the desulfurization of an odorant from a hydrogen gas. In particular, the Office Action cites DE 220 as allegedly teaching a roll carrier capable of holding zeolite or active carbon to remove sulfur from a hydrogen-rich gas stream, Ternan as allegedly teaching the use of activated carbon to purify a mixed gas that produces hydrogen, and Ukai as allegedly teaching the use of zeolite and noble metal catalysts in producing hydrogen. The Office Action concludes that the teachings of the references would have led one of ordinary skill in the art to have utilized the active carbon/zeolite/noble metal of both Ternan and Ukai in the roll carrier of DE 220, and to have included this structure in the deodorization part 28 of JP 701, thereby allegedly achieving the presently claimed subject matter. Applicants respectfully disagree.

Regarding Ukai, Applicants respectfully submit that the Patent Office's summation of the teachings of this reference are not accurate. Specifically, although the Office Action alleges that Ukai discloses the use of noble metal catalysts in the purification of hydrogen gas,

this is not correct. In paragraphs [0187] - [0188], Ukai describes various reforming catalysts, including platinum, on a metal oxide carrier that may be used in the reforming reaction. Ukai describes that the disadvantage of using platinum is that carbon is precipitated easily in comparison with other catalysts, but that this disadvantage may be addressed by using a metal oxide carrier for the catalyst.

However, the reforming reaction referred to in this portion of Ukai is for forming a hydrogen gas, and is not for desulfurizing or deodorizing the hydrogen gas. In other words, Ukai does not here describe the use of noble metal catalysts for desulfurizing or deodorizing a hydrogen gas.

With respect to desulfurization, Ukai separately teaches the use of a sulfur removal unit provided either before or after the reforming catalyst (see, for example, paragraphs [0194] and [0199]), or in-line with the reforming catalyst in a two-stage reforming unit (see paragraph [0204]). The materials taught by Ukai for the removal of sulfur are zinc oxide (paragraph [0194]), zeolite (paragraph [0199]) and a zinc-copper material (paragraph [0267]). However, Ukai does not describe that the platinum catalyst used in the reforming reaction may be used as a catalyst in decomposing adsorbed sulfur-containing compounds in the hydrogen gas.

Thus, contrary to the assertions in the Office Action, Ukai does not describe the use of a catalyst in combination with a carrier or an odorant adsorbent in an odorant treatment portion. One of ordinary skill in the art would not have been directed by Ukai to have used a noble metal catalyst on a carrier or in combination with an odorant adsorbent as alleged in the Office Action.

Ternan describes that a hydrocarbon feedstock may be desulfurized by passing through a fixed bed of adsorbent, wherein the adsorbent comprises activated carbon or an activated carbon adsorbent impregnated with copper. See paragraph [0021] of Ternan.

First, although Ternan indicates that the fixed bed may include an activated carbon adsorbent impregnated with copper, copper is not a catalyst for decomposing adsorbed sulfur compounds adsorbed by a porous adsorbent. Ukai describes a zinc-copper material as a catalyst for removing carbon monoxide from a post-reforming gas (see paragraph [0267] of Ukai). For sulfur, Ukai indicates that the copper atom forms a coordinate bond with sulfur in the sulfur-containing compound, which would indicate that the copper is not acting as a catalyst per se. Instead, copper in this function is acting as a sequestration agent (i.e., it adsorbs sulfur compounds), and not as a decomposition catalyst. See also U.S. Patents Nos. 7,063,732 and 7,148,389 similarly describing the use of copper based active carbon adsorbent beds for adsorbing sulfur-containing compounds. Accordingly, the activated carbon adsorbent impregnated with copper described in Ternan is merely an adsorbent, and is not an adsorbent together with a catalyst.

Thus, like Ukai, Ternan describes only the use of an adsorbent material for adsorbing sulfur-containing materials in a hydrogen gas, and nowhere describes the use of an adsorbent together with either a carrier or a catalyst as in the present claims.

DE 220 was cited solely for allegedly disclosing a roll carrier. Thus, DE 220 also does not describe an adsorbent in combination with a catalyst as in the present claims, much less an adsorbent in combination with a catalyst that are both carried upon a carrier as in present claims 1 and 14.

Finally, with respect to claim 6 and new claims 19-21, as is apparent from the foregoing discussion, none of the references describe the combination of a catalyst comprised of a noble metal such as platinum with porous adsorbents on a carrier for use in desulfurization, and thus the references also would not have led to the features of dependent claims 6 and 19-21 for this reason.

As such, the combined teachings of JP 701, DE 220, Ternan and Ukai nowhere provide any reason or rationale for one of ordinary skill in the art to have utilized an adsorbent together with a decomposition catalyst carried on a carrier that is used in an odorant treatment portion of a hydrogen gas supply unit as required in claims 1 and 14. Reconsideration and withdrawal of this rejection are thus respectfully requested.

II. Rejoinder

Applicants respectfully submit that upon allowance of the elected claims, claims 11-13 and 15-17 should be rejoined with the application and similarly allowed. All the withdrawn claims include the allowable subject matter of the elected claims.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1 and 3-21 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,


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